



SEQUENCE LISTING

<110> Neeper, Michael P.
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Chen, Ling
Wang, Xin-Min

<120> SYNTHETIC HUMAN PAPILLOMAVIRUS GENES

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<141> 2000-08-21

<150> PCT/US00/22932

<151> 2000-08-21

<150> 60/210,143

<151> 2000-06-07

<150> 60/150,728

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<160> 150

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accctggccg tgagcaagaa caaggccctg caggcccgcg agctgcagct gaccctggag 240
accatctaca acagccagta cagcaacgag aagtggaccc tgcaggacgt gagcctggag 300
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cacgagggca	tccgcaccta	cttcgtgcag	ttcaaggacg	acgccgagaa	gtacagcaag	540
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<211> 297

<212> DNA

<213> Artificial Sequence

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<223> Mutant, Codon-Optimized HPV16 E7

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tgcgacagca	ccctgcgcct	gtgcgtgcag	agcaccacac	tggacatccg	caccttgag	240
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<211> 297

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon-Optimized HPV6a E7

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atcgacggcg	tgaaccacca	gcacctgccc	gctcgcaggg	ccgagcccca	gcgccacacc	180
atgctgtgca	tgtgctgcaa	gtgcgaggcc	cgcacgcagc	tgggtggtgga	gagcagcgct	240
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<223> Codon-Optimized HPV16 L1 fragment

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<211> 129

<212> DNA

<213> Artificial Sequence

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<223> Codon-Optimized HPV16 L1 fragment

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<211> 129

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<223> Codon-Optimized HPV16 L1 fragment

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<211> 135

<212> DNA

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<211> 135

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<212> DNA

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<223> Codon-Optimized HPV16 L1 fragment

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ggggttcac 129

<210> 19
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 <210> 29
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<223> Codon-Optimized HPV16 L1 fragment

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<210> 30
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gacagcgac
60
120
129

<210> 34
<211> 132
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 34
gtgctgcttg gcctcctggg cggatgaacag ggcgtgggag gtctcggtct cggcctgggt
caggtagtcg ttgtcgttca cgatgaagtc caccaggtcc tcgccggtgt cgctgtcgtt
60
120

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ctcgtttctcg tc 132

<210> 35
<211> 132
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 35
gccaggagg ccaagcagca ccgcgacgcc gtgcaggtgc tgaagcgcaa gtacctgggc 60
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atctgcatcg ag 132

<210> 36
<211> 131
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 36
ctcgtggcgg ccctccacct gcagcatctg ctgggtctcc acctcggtgt tgccgtagcc 60
gctgtcctcg ctctcgaaca ggcggcgctt ggcggcgagg ctctgcttct cgatgcagat 120
ggccttcagg c 131

<210> 37
<211> 132
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 37
caggtggagg gccgccacga gaccgagacc ccctgcagcc agtacagcgg cggcagcgcc 60
ggcggctgca gccagtacag cagcggcagc ggcggcgagg gcgtgagcga gcgccacacc 120
atctgccaga cc 132

<210> 38
<211> 135
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 38
cttgaagggg cgcaccagct cgctgaagct cagcggctac agctccttga acttggccag 60
catggcgggc ttggcggtgc tggctctcag caggttcagg atgttggtca gaggggtctg 120
gcagatgggtg tggcg 135

<210> 39
<211> 135
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

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<400> 39
 gagctgggtgc gccccttcaa gagcaacaag agcacctgct gcgactgggtg catcgccgcc 60
 ttcggcctga ccccagcat cgccgacagc atcaagacc tgctgcagca gtactgcctg 120
 tacctgcaca tccag 135

<210> 40
 <211> 136
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 40
 catggggctc acgcacagca gcttgctcag cagcttctcg atggctctgc gggtcttgcc 60
 gcactttagt cgcaccagca gcagcaccac catgcccag ctgcaggcca ggctctggat 120
 gtgcaggtac aggcag 136

<210> 41
 <211> 132
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 41
 ctgctgtgctg tgagcccat gtgcatgatg atcgagcctc ccaagcttcg cagcaccgcc 60
 gccgccctgt actggtacaa gaccggcatc agcaacatca gcgaggtgta cggcgacacc 120
 cccgagtga tc 132

<210> 42
 <211> 129
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 42
 ggcgatctcg ctgtcgtcca cgatgtcggt gtcgtaggcc cactgcacca tctggctcag 60
 ctcgaagggtg cagtcgttga agctgtgctg cagcacggtc tggcgctgga tccactcggg 120
 ggtgtcgcc 129

<210> 43
 <211> 129
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 43
 gtggacgaca gcgagatcgc ctacaagtac gccagctgg ccgacaccaa cagcaacgcc 60
 agcgccttcc tgaagagcaa cagccaggcc aagatcgtga aggactgcgc caccatgtgc 120
 cgccactac 129

<210> 44
 <211> 129
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 44
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 gtacttgatc cactggctca tgctcatctg cttcttctcg gcgcgcttgt agtggcggca 120
 catggtggc 129

<210> 45
 <211> 129
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 45
 cagatcgtga tgttcctgcg ctaccagggc gtggaattca tgagcttcct gaccgccctg 60
 aagcgcttcc tgcagggcat cccaagaag aactgcatcc tgctgtacgg cgccgccaac 120
 accgacaag 129

<210> 46
 <211> 130
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 46
 gccgatcttg gcgtcggcca ggggctgcag ccagaagtgg ctcttgctgt tcacgaagca 60
 gatcacgctg cctgcagga acttcatcag gctcatgccg aacaggctct tgcggtgtt 120
 ggcggcgccg 130

<210> 47
 <211> 129
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 47
 ctggccgacg ccaagatcgg catgctggac gacgccaccg tgccctgctg gaactacatc 60
 gacgacaacc tgcgcaacgc cctggacggc aacctggtga gcatggacgt gaagcaccgc 120
 cccttggtg 129

<210> 48
 <211> 132
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV16 E1 fragment

<400> 48
 gaactcggtg gggaagggtga acaccaccag gcggttgctg aggtagggcc agcggctgtc 60
 ggtgccggcg ttgatgttgc tggatgacag caggggaggg cacttcagct gcaccagggg 120
 gcggtgcttc ac 132

<210> 49
 <211> 126

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<400> 54
cttgaagggg cgcaccagct c
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<220>
<223> Codon-Optimized HPV16 E1 fragment

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<210> 56
<211> 21
<212> DNA
<213> Artificial Sequence
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<400> 56
catggggctc acgcacagca g
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<220>
<223> Codon-Optimized HPV16 E1 fragment

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<210> 58
<211> 21
<212> DNA
<213> Artificial Sequence
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<400> 58
gtagtggcgg cacatggtgg c
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<220>
<223> Codon-Optimized HPV16 E1 fragment

$$\begin{array}{ll} \langle 210 \rangle & 60 \\ \langle 211 \rangle & 21 \end{array}$$

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<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 60
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<210> 61
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 61
gtgttcacct tccccaacga gttc 24

<210> 62
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 62
gaactcgttg gggaaggatga acac 24

<210> 63
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 63
catgagagat ctttacaggg tggtg 25

<210> 64
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E1 fragment

<400> 64
catctcagat ctgccacat ggccgacccc gccggcac 38

<210> 65
<211> 99
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 65

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atggagaccc tgtgccagcg cctgaacgtg tgccaggaca agatcctgac ccactacgag 60
aacgacagca ccgacctgcg cgaccacatc gactactgg 99

<210> 66
<211> 104
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 66
ccaccagggtg gtgcccaccc tggccgtgag caagaacaag gccctgcagg ccgccgagct 60
gcagctgacc ctggagacga tctacaacag ccagtacagc aacg 104

<210> 67
<211> 108
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 67
ccggctgcat caagaagcac ggctacaccg tggagggtgca gttcgacggc gacatctgca 60
acaccatgca ctacaccaac tggacccaca ttacatctg tgaggagg 108

<210> 68
<211> 104
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 68
cgtgcacgag gggatccgca cctacttcgt gcagttcaag gacgacgccg agaagtacag 60
caagaacaag gtgtgggagg tgcacgccgg aggccagggtg atcc 104

<210> 69
<211> 110
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 69
ggccaaccac agcgccgcca cccacaccaa ggccgtggcc ctgggcaccg aggagaccca 60
gaccacaatc cagcgccctc gcagcgagcc cgacaccggc aaccctgcc 110

<210> 70
<211> 107
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 70
gccacaaggg ccggatcaac tgcaacagca acaccacccc tatcgtgcac ctgaagggcg 60
acgccaacac cctgaagtgc ctgcggtacc gcttcaagaa gactgc 107

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<211> 110
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 76
cgtaggtcag ggtcacgata gcgctcttgt gcttcacgtt gtggccggtc cagtgccagg      60
tgctgctcac ggcggtgtac agcttgacagt gcttcttgaa gcggtaccgc                  110

<210> 77
<211> 111
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 77
tttagatgct catgaagccg gtgctcacgg tgatggtctt ggggatcttc acctggctca      60
ggaactggtc gcgctgccac tcgctgtcgt aggtcagggt cacgatagcg c                  111

<210> 78
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 78
cgagctgata tcgaattcag atctgccacc atggagaccc tgtgccagcg                    50

<210> 79
<211> 45
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 79
ggttgcagat ctagactcga gtttagatgc tcatgaagcc ggtgc                        45

<210> 80
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV16 E2 fragment

<400> 80
ccggctgcat caagaagcac g                                                    21

<210> 81
<211> 19
<212> DNA
<213> Artificial Sequence

<220>

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<400> 86
gccgagcccg accgcgcccc ctacaacatc gtgaccttct gctgcaagtg cgacagcacc    60
ctgcgcctgt gcgtgcagag caccacgctc gacatccgca ccctgg                106
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<210> 87
 <211> 96
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV16 E7 fragment

 <400> 87
 gggcgcggtc gggctcggcc tggccggcgg ggccgctgat ctgctcctct tcctcgtgc 60
 tgtcgttcag ctggccgtag ccgtacaggt cgggtg 96

 <210> 88
 <211> 106
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV16 E7 fragment

 <400> 88
 ccgcggcaga tctagactcg agtttagggc ttctggctgc agattgggca caccgattccc 60
 aggtgtccca tcagcaggtc ctccagggtg cggatgtcga cgtggg 106

 <210> 89
 <211> 25
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV16 E7 fragment

 <400> 89
 ggccggagat ctgatatcga attcg 25

 <210> 90
 <211> 20
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV16 E7 fragment

 <400> 90
 ccgcggcaga tctagactcg 20

 <210> 91
 <211> 105
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Codon-Optimized HPV6a E7 fragment

 <400> 91
 gtcacagatc tgatatcgaa ttccaccatg caccggccgcc acgtgaccct gaaggacatc 60
 gtgctggacc tgcagcctcc cgaccccggtg ggcctgcact gctac 105

 <210> 92
 <211> 105
 <212> DNA
 <213> Artificial Sequence

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<220>
<223> Codon-Optimized HPV6a E7 fragment

<400> 92
ctggaagtgc tgcttcaggg gctgggtgtc ctggcgtcc acctcggtcca cctcgctctc      60
gctgctgtcc accagctgct cgtagcagtg caggcccacg gggtc                      105

<210> 93
<211> 107
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6a E7 fragment

<400> 93
ccagcccctg aagcagcact tccagatcgt gacctgctgc tgcgggtgcg acagcaacgt      60
gcgccctggtg gtgcagtgca ccgagaccga catccgcgag gtgcagc                    107

<210> 94
<211> 102
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6a E7 fragment

<400> 94
cagtcagatc tagagatatc tttaggtctt gggagcgcag atggggcaca cgatgttcag      60
ggtaccacgc aggagctgct gcacctcgcg gatgtcggtc tc                          102

<210> 95
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 95
gtcacagatc tgatatcgaa ttcc                                              24

<210> 96
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> PCR Primer

<400> 96
cagtcagatc tagagatatc tttagg                                           26

<210> 97
<211> 109
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV18 E7 fragment

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[illegible]

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<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 108
cggtgtcctg cacgtacacg tccgtccaca ccacgtagtc catgggtgtg ttggcgcagc      60
cgtcgaactt cacctccacg gtcttgccgc gcttcttgaa gc                        102

<210> 109
<211> 102
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 109
ccgacgtgta cgtgcaggac aacgacacct ggggtgaaggt gcacagcatg gtggacgcca      60
agggcattcta ctacacctgt ggccagttca agacctacta cg                        102

<210> 110
<211> 92
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 110
gctgccgtag cacacctccc agtgcttggt gctgccgtac ttctcggcct ccttcacgaa      60
gttcacgtag taggtcttga actggccaca gg                                          92

<210> 111
<211> 94
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 111
gcactgggag gtgtgctacg gcagcaccgt gatctgcagc cccgctagcg tgagcagcac      60
caccaggag gtgagcatcc ccgagagcac cacc                                          94

<210> 112
<211> 97
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 112
gcgaggaggg gtctgcacgg cgtcttcctt ggtgctgctg ctcaccaggg tgctggtctg      60
ggcgggagtg tagtggtgc tctcggggat gctcacc                                          97

<210> 113
<211> 97
<212> DNA
<213> Artificial Sequence

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<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 113
ggacgccgtg cagaccctc ctgcaagcg cggcgcggc gtgcagcaga gcccctgcaa 60
cgccctgtgc gtggcccaca tcggccccgt ggacagc 97

<210> 114
<211> 94
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 114
ggcgctgctg ttgctgttgt tgcggcgctg gtgctggctg tggttgttgg tgatcagggt 60
gtggttgccg ctgtccacgg ggccgatgtg ggcc 94

<210> 115
<211> 95
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 115
ccgcaacaac agcaacagca ggcgcactcc catcgtgcag ttccagggcg agagcaactg 60
cctgaagtgc ttccgctacc gcctgaacga tcgcc 95

<210> 116
<211> 96
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 116
cgtgcttggtg gggagccttg ctgctggccc agtgccaggt gctgctgac aggtcgaaca 60
ggtggcggtg gcgatcggtc aggcggtagc ggaage 96

<210> 117
<211> 95
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 117
gcagcaaggc tccccacaag cagccatcg tgaccgtgac ctacgacagc gaggagcagc 60
gccagcagtt cctggacgtg gtgaagatcc ctccc 95

<210> 118
<211> 96
<212> DNA
<213> Artificial Sequence

<220>

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[illegible]60
96

25

21

25

25

21

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<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 124
ggcgctgctg ttgctgttgt tgc
23

<210> 125
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 125
ccgcaacaac agcaacagca gc
22

<210> 126
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV6 E2 fragment

<400> 126
ctcgagagat ctccccgggtc tagagc
26

<210> 127
<211> 97
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV18 E2 fragment

<400> 127
gaattcagat ctgatatcac catgcagact cccaaggaga ccctgagcga ggcgctgagc
gcctgcagg acaagatcat cgaccactac gagaacg
60
97

<210> 128
<211> 98
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV18 E2 fragment

<400> 128
cgaagaagat ggcgttctcc cagcggatca gctgccagta ctggatctgg ctgtcgatgt
ccttgctgtc gttctcgtag tggtcgatga tcttgtcc
60
98

<210> 129
<211> 94
<212> DNA
<213> Artificial Sequence

<220>

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<223> Codon-Optimized HPV18 E2 fragment

<400> 129
ccgctgggag aacgccatct tcttcgccgc tcgcgagcac gggatccaga ccctgaacca 60
ccagggtgtg cccgcctaca acatcagcaa gagc 94

<210> 130
<211> 94
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV18 E2 fragment

<400> 130
cctcggctct gtaggcgctc tgggccaggc cctgcagggc catctgcagc tcgatggcct 60
tgtgggcctt gctcttgctg atgttgtagg cggg 94

<210> 131
<211> 91
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV18 E2 fragment

<400> 131
cccagagcgc ctacaagacc gaggactgga ccctgcagga cacctgcgag gagctgtgga 60
acaccgagcc caccactgc ttcaagaagg g 91

<210> 132
<211> 94
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV18 E2 fragment

<400> 132
gctgtcccag gccacgtagt tcatgcagtt gtccttgctt cgtcgaagt acacctgcac 60
ggctctggcct cccttcttga agcagtggtt gggc 94

<210> 133
<211> 90
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV18 E2 fragment

<400> 133
gcatgaacta cgtggcctgg gacagcgtgt actacatgac cgacgccggc acctgggaca 60
agaccgccac ctgcgtgagc caccgcggcc 90

<210> 134
<211> 92
<212> DNA
<213> Artificial Sequence

<220>
<223> Codon-Optimized HPV18 E2 fragment

<400> 134
 ccgtacttct cgcactcgct cttgaactcg atgtagaagg tgttgtagcc ctccttcacg 60
 tagtacaggc cgcggtggct cagcaggtg gc 92

<210> 135
 <211> 94
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV18 E2 fragment

<400> 135
 cgagttcaag agcgagtgcg agaagtagcg caacaccggc acctgggagg tgcacttcgg 60
 caacaacgtg atcgactgca acgacagcat gtgc 94

<210> 136
 <211> 100
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV18 E2 fragment

<400> 136
 gctgtagggg ctgggagtgt gctgcagctg cttcaccagc tgggtggcgc tcacgggtgc 60
 gtcgctggtg ctgcacatgc tgcgttgca gtcgatcacg 100

<210> 137
 <211> 93
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV18 E2 fragment

<400> 137
 gcacactccc agcccctaca gcagcacgt gagcgtgggc accgccaaga cctacggcca 60
 gaccagcgcc gccactcgcc ctggccactg cgg 93

<210> 138
 <211> 96
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV18 E2 fragment

<400> 138
 gcttggtggt gccggtggcg gtggcggcgc ccagcagagg gttcacgggc ccgcagtgct 60
 gcttctcggc caggccgcag tggccagggc gactgg 96

<210> 139
 <211> 97
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV18 E2 fragment

<400> 139
 gccaccgcca ccggcaacaa caagcgccgc aagctgtgca gcggcaacac cactcccatc 60

atccacctga agggcgaccg caacagcctg aagtgcc 97

<210> 140
 <211> 97
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV18 E2 fragment

<400> 140
 ggcgccggtc cagtgccagg tgctgctgat gtcgcggtag tggtcgctgt gcttgcgcag 60
 gcggtaccgc aggcattca ggctgttgcg gtcgccc 97

<210> 141
 <211> 99
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV18 E2 fragment

<400> 141
 gcacctggca ctggaccggc gccgggaacg agaagaccgg catcctgacc gtgacctacc 60
 acagcgagac ccagcgcacc aagttcctga acaccgtgg 99

<210> 142
 <211> 98
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Codon-Optimized HPV18 E2 fragment

<400> 142
 ctcgagagat ctcccgggtc tagagcttac atggtcatgt agcccaccag gatctgcacg 60
 ctgtcgggga tggccacggt gttcaggaac ttggtgcg 98

<210> 143
 <211> 25
 <212> DNA
 <213> Artificial Sequence

<220>
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